Who Needs Who?

Next Generation Science Standards:

- MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Hawai'i Content and Performance Standards III:

- SC.7.3.2 Explain the interaction and dependence of organisms on one another.
- SC.7.4.4 Classify organisms according to their degree of relatedness.
- SC8.5.1 Describe how changes in the physical environment affect the survival of organisms.

Description:
In this activity students will become a piece of the environment (nectar, bird, insect, plant, etc.). Through a game, they will come to understand how everything in nature is interconnected, and how changes in the physical environment can have either a negative or positive impact on the survival of a species. It also illustrates that an effect on one factor can influence all the others. The activity concludes with a message of hope as students brainstorm how people can help to protect biodiversity by protecting native species.

Duration: 45 minutes

Objectives: At the end of this lesson, the students will be able to:

- Understand that biodiversity of an ecosystem depends on many interconnected factors and that an effect on one factor can influence all the others.
- Identify endemic and endangered species in Maui and explain why native habitats are critical to the survival of these species.

Background:
We have already heard what biodiversity is now we are going to learn why biodiversity is important. We are going to do an activity to demonstrate how interconnected each creature is with everything in its environment. The main theme to explore is the interconnections that exist in nature, and the fragile nature of some native habitats.

Vocabulary:
Ecosystem: A group of organisms occupying a particular area, interacting with each other and their environment.
Interdependence: The relationship that species have where they depend on one another in the web of life.
Niche: The job, place, position, or activity for which an organism is best suited.

Species: A group of similar individuals that can usually breed among themselves and produce fertile offspring.

Materials Needed:
Species Nametags: Print & cut apart (included)
Large spool of yarn
Tape

Procedure:

Step 1: Review Interdependence

Read quote from John Muir- "When one tugs at a single thing in nature, he finds it attached to the rest of the world." What does interdependence mean? It is the relationship that species have where they depend on one another in the web of life. We are going to do an activity to demonstrate how interconnected each creature is with everything in its environment.

Step 2: Hand out species nametags and research species relationships

- Hand out species nametags-they will represent that species.
- Write the following questions on the board. Have each student copy these questions down.
- What do I need to survive?
- What is my job or niche in the ecosystem?
- What other species am I connected to?
- Where do I live?
- Each student researches the answers for the specific specie they are assigned.
- This research gives them a "list" of some possible relationships that their species shares with other species and their environments.
- Interdependent Relationships for "Who Needs Who" Game:
    - **ʻApapane -** ʻōhiʻa lehua, insects, koa, māmane, lobelia, pueo
    - **ʻŌhiʻa Lehua -** ʻapapane, ʻiʻiwi, Maui ʻalauahio, insects
    - **Māmane -** ʻiʻiwi, ʻapapane, Maui ʻalauahio, māmane
    - **Maui ʻAlauahio -** ʻŌhiʻa lehua, insects, māmane, pueo
    - **Insects -** Maui ʻalauahio, ʻapapane, koa, ʻōhiʻa lehua, grasses, māmane, ʻiʻiwi
    - **Pueo -** ʻapapane, ʻiʻiwi, Maui ʻalauahio
    - **ʻIʻiwi -** ʻōhiʻa lehua, māmane, lobelia, insects, pueo
    - **Nēnē -** grasses
    - **Grasses -** nēnē, insects
    - **Snails -** koa
    - **Koa -** snails, ʻapapane, insects

    - **Lobelia -** ʻiʻiwi, ʻapapane
- Have students tape their nametag on the front of their shirt.

Step 3: Explain and play "Who Needs Who" Game

- This activity could be done outside (where possible).
- Everyone gets in a circle**.** Start with one species (anyone), hand them the yarn and ask them to reflect on what it needs to survive (while holding on TIGHT to their end).
- They unwind the yarn a couple feet and then toss the whole ball of yarn (you will need the slack) to a species it depends on (while holding on TIGHT to their end) and make a statement explaining why they threw it to them.
- This process repeats until each student gets the yarn at least once (it will eventually look like a spider web).
- Illustrate how negative factors can influence the web of interconnectedness:
    - Ask the group to name any threat that could come in and hurt this ecosystem. = Goats, predators, invasive species, avian malaria, etc.
    - Then, have one species pull on their string and see if anyone else felt that pull. Who felt it? Who do you need? Are you connected to more species than you original research showed?
    - Ask the group to name another threat that could come in and hurt this ecosystem. Have the species it affected drop their string completely. You just went extinct!
    - Now, have anyone who relied on that species also drop their string.
    - What has happened to our web? What does that mean?
- Illustrate how positive factors can influence the web of interconnectedness:
    - Ask the group to name a positive way that people could help this ecosystem. = Replanting, not introducing invasive species, volunteering, fencing, etc.
    - Have the species that is helped pick up their string again.
    - Now, have anyone who relied on that species also pick up their string.
    - What has happened to our web? What does that mean?

Step 4: Reflect and Conclusion

- What have you learned about the interconnectedness of species?
- What makes a native habitat so critical to the survival of endemic species?
- Biodiversity is important because it provides more opportunities for interconnectedness. With less biodiversity, the overall health of an ecosystem is threatened.
- Challenge the group to think about how the whole class working together to do these activities successfully is like a natural ecosystem.
- Talk about the ways that they as individuals and as a class can help educate other people about Maui's biodiversity.

SPECIES NAMETAGS

‘Apapane
‘Ōhi‘a Lehua
Māmane
‘Alauahio

Insects
Pueo
ʻIʻiwi
Nēnē

Grasses
Snails
Koa
Lobelia